Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SIT06-P03 会場:コンベンションホール 時間:5 月 25 日 18:15-19:30

Viscosity and structure of anorthite melt under high pressure and high temperature conditions

Viscosity and structure of anorthite melt under high pressure and high temperature conditions

坂巻 竜也 [1*] ; 河野 義生 [2]
SAKAMAKI, Tatsuya[1*] ; KONO, Yoshio[2]

[1]Department of Earth and Planetary Materials Science, Tohoku University, [2]HPCAT, Geophysical Laboratory, Carnegie Institution of Washington
[1]Department of Earth and Planetary Materials Science, Tohoku University, [2]HPCAT, Geophysical Laboratory, Carnegie Institution of Washington

The viscosity and structure of the anorthite ($CaAl_2Si_2O_8$) melt has been measured up to 6.1 GPa and 2173 K using the in-situ falling sphere method with X-ray radiography for viscosity and energy-dispersive X-ray diffraction technique for structure at beamline 16-BM-B of the Advanced Photon Source. The viscosity of the melt decreases with pressure up to 4 GPa, and then increases. The viscosity and its pressure dependence of anorthite melt are smaller than albite melt, which is also fully polymerized melt. Obtained structural information support the difference in viscosity behavior between anorthite and albite melts. Anorthite melt shows a smaller shift of the first sharp diffraction peak (FSDP) in the structure factor, S(Q), to higher-Q with pressure than albite one, indicating the pressure-induced structural shrinkage of an intermediate-range order is small. The radial distribution function, G(r), of anorthite melts exhibits the longer T-O distance, which is the length between tetrahedrally coordinated cations and oxygen. The TO_4 tetrahedra are the most fundamental units in the silicate melts, and the T-O distance reflects strength of the units. Thus, anorthite melt initially shows the low viscosity due to longer T-O distance. On the other hand, a pressure dependence of T-T distance in anorthite melt is smaller than albite one, and T-O-T angle is also small.

キーワード: viscosity, structure, anorthite melt, albite melt,, high pressure
Keywords: viscosity, structure, anorthite melt, albite melt, high pressure